NHDOT SPR2 PROGRAM
RESEARCH PROGRESS REPORT

INSTRUCTIONS:

Project Managers and/or research project investigators should complete a progress report at least every three months during the project duration. Reports are due the 5th of the month following the end of the quarter. Please provide a project update even if no work was done during this reporting period.

Project # 26962N	**Report Period** Year: 2017 ☒Q1 (Jan-Mar) ☐Q2 (Apr-Jun) ☐Q3 (Jul-Sep) ☐Q4 (Oct-Dec)	
Project Title: Layer Coefficients for NHDOT Pavement Design		
Project Investigator: Eshan Dave and Jo Sias Daniel **Phone:** 603-862-5268, 603-862-3277 **E-mail:** eshan.dave@unh.edu, jo.daniel@unh.edu		
Research Start Date: December 1, 2016	**Research End Date:** September 30, 2018	**Project schedule status:** ☒ On schedule ☐ Ahead of schedule ☐ Behind schedule

Brief Project Description:

At present, New Hampshire Department of Transportation (NHDOT) employs AASHTO Empirical Pavement Design procedure for structural design of highways (new construction, reconstruction and major rehabilitations). The AASHTO procedures uses material specific coefficients (commonly called layer coefficients) to account for the structural capacity provide by each pavement layer. The current layer coefficients used by NHDOT are a combination of the original values proposed by AASHTO in 1960s and research conducted by Janoo in 1994 (CRREL Special Report 94-30). The research by Janoo was primarily focused on layer coefficient characterization of subgrade soils and aggregate courses. The asphalt mixtures in use today and vehicle loadings are substantially different from the ones characterized by AASHTO during the development of the design guide in 1960s. With current use of newer asphalt binder modification technologies, allowance for recycled materials (RAP, ground tire rubber), and newer manufacturing and construction techniques (such as, cold in-place recycling) there is an urgent need to reevaluate the layer coefficients for materials that are currently being used in construction of State pavements. Due to lack of reliable layer coefficient values, there is high potential for over-design of pavements that translate in substantially higher spending. In order to promote sustainability and to maintain integrity through reliable pavement designs, this research study will characterize asphalt mixtures currently used by State for determination of the actual layer coefficient values for those materials.

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

- The project kick-off meeting between researchers and technical advisory group (TAG) was held during this past quarter in Concord NH. A finalized version of laboratory testing plan was presented to TAG during the project kick-off meeting. Methodology of developing the layer coefficients using the pavement management system (PMS) data from the projects that use same and similar mixes as evaluated in this project was also discussed.

- An in depth literature review was conducted on the topic of asphalt mixture resilient modulus testing and its influential variables. Also, a survey was conducted from 27 state DOTs to investigate their pavement design process and the different layer coefficient values for their mixtures in case they use AASHTO 1993 design guide. The survey confirmed that the NHDOT's layer coefficient value is relatively lower even compared to adjacent states with similar climatic and probably traffic conditions.

- The actual lab testing on the 8 mixtures that have already been samples started immediately after the project kickoff meeting. Since the target air void for resilient modulus and the dynamic modulus testing samples is determined to be 7%, researchers established the bulk specific gravity at the desired air void. The maximum specific gravity of the samples was also determined. Currently, the researchers are in the process of manufacturing the samples for dynamic modulus as well as resilient modulus testing.

- The equipment for running the resilient modulus test was prepared and the MTS device has been programed to run the haversine loading form in accordance to the test standard.

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Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc…):

- As per the discussions during the kick-off meeting, researchers will work together with NHDOT staff to obtain access to the PMS data.

- Sampling effort for the remaining mixtures need to be undertaken by NHDOT during the 2017 construction season that will start within the upcoming quarter.

Anticipated research next 3 months:

- Laboratory Evaluation: Researcher anticipate to complete the resilient and complex modulus testing of the eight mixtures that have been sampled in 2016.

- Analysis: Results from the laboratory testing effort will be analyzed during the upcoming quarter. Researchers will also work with NHDOT staff to identify past projects that utilized mixtures similar to the ones studied herein so that PMS data for those pavements can be obtained.

- Reporting: The completed literature review from past quarter will be compiled in form of a technical memo along with the finalized laboratory testing plan.

Circumstances affecting project: Describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and budget, along with recommended solutions to those problems.

Tasks (from Work Plan)	Planned % Complete	Actual % Complete
Literature Review and Testing Plan	**100**	**100***
Laboratory Characterization	**10**	**10**
Development of Layer Coefficient	**0**	**0**
Reporting	**0**	**0**

While the literature review has been concluded and testing plan has been finalized, a short report for both is currently under development. This is expected to be completed in the upcoming quarter.